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BIOLOGICAL CONTROL OF NEMATODES BY NEMATODES. II. SEINURA (NEMATODA: APHELENCHOIDIDAE)

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The genus Seinura was established by Fuchs in 1931 (2). Six years later Linford and Oliveira (4) found that Seinura spp. were predaceous on nematodes in Hawaiian soils. In Hawaii, Seinura consumed root-knot (Meloidogyne spp.) and lesion nematodes (Pratylenchus pratensis) (de Man, 1880) Filipjev, 1936). Seinura spp. are common in Florida soils and may have an important role in the natural balance existing among the dense and diverse populations of nematode species.

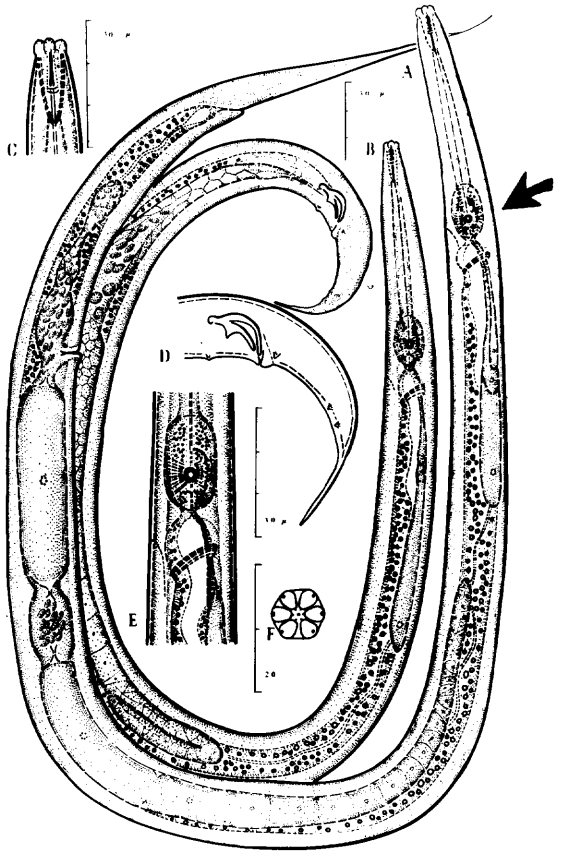

Fig. 1. Seinura tenuicaudata. A. female, B. male, C. female head, D. male tail, E. median bulb, F. en face. (After Hechler)

Characterization: Seinura are slender nematodes, usually about 1/2 to 3/4 of a mm long, rarely more than 1 mm in length, with a thin cuticle (skin). The principal characters are: a narrowly sharp conoid to a short filamentous tail (Fig. 1A), a very wide pronounced metacorpus (Fig. 1A-arrow), and a very slender spear (Fig. 1C) with small knobs, or posterior spear thickenings of various densities that are difficult to define in some species.

Habitat: Seinura spp. have been detected in a variety of field and greenhouse soils in Florida. In a Florida pinewood survey, Seinura spp. were commonly encountered in numerous wood tissue samples from 3 species of pine and a single collection of sweetgum (1). Elsewhere, Seinura usually occurs in soil associated with roots of an agricultural crop plant. Massey (6) found 3 species of Seinura associated with bark beetles inside the trunks of ponderosa pines.

Prey: There are 39 species of Seinura. S. tenuicaudata (de Man, 1895) J. B. Goodey, 1960 (Fig. 1), has been reported feeding on Aphelenchus avenae Bastian, 1865 (3), Ditylenchus dipsaci (Kuhn, 1857) Filipjev 1936 (3), Heterodera trifolii Goffart, 1932 (3), Meloidogyne hapla Chitwood, 1949 (3), Neotylenchus linfordi Hechler, 1962 (3), and Pratylenchus pratensis (4). In Florida, Seinura spp. have devoured Radopholus similis (Cobb, 1893) Thorne,

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1949 (Fig. 2), Tylenchulus semipenetrans Cobb, 1913 (Fig. 3), two of the most serious pests of citrus, and many genera of bacteriophagous nematodes (Fig. 4).

Attack: When lips contact prey, the spear thrusts against the epidermis of the prey until penetration is effected (Fig. 2-left), providing the prey does not escape. When the spear enters the prey body, enzymes are injected into the prey, causing the loss of its locomotion function, and feeble, uncoordinated movements result. The metacorpus valve pulsates, injecting more digestive enzymes into the prey which causes the disintegration of prey tissue into particles small enough to enter the predator's spear opening. The metacorpus bulb pulsates 30 sec to 2 min sucking sustenance from the prey (5). The regime of enzyme injection followed by intake continues until the prey is empty or the predator full. Should the spear be withdrawn shortly after penetration, the prey does not regain its locomotion ability, and internal digestion proceeds to destroy internal organs (5). One Seinura kills many nematodes. Nematodes under attack attract more predators (Fig. 5). Eighteen Seinura were seen feeding on a single nematode (3).

Resistance: Hoplolaimus galeatus (Cobb, 1913) Thorne, 1935, and Xiphinema sp. resisted the attack of Seinura tenuicaudata (3).

Cannibalism: On agar plates when prey is abundant, cannibalism does not normally occur. Should prey become scarce, cannibalism becomes rampant until only a few scattered Seinura individuals remain. Cannibalistaic Seinura spp. appear starved and translucent and seldom lay eggs (3).

Life Cycle: At 28 C one generation of Seinura is completed in 5 1/2 to 6 days (3).

Biological Control Potential: Unfortunately, the biological control potential is unknown. Despite the fact that Seinura spp. kill prey larger than themselves (Fig. 2), that a single specimen can kill many nematodes, and that very limited studies reveal that several species of economically important phytoparasitic nematodes serve as prey, no attempts at utilization of its predator potential have been made. Species of Seinura, however, are relentlessly and continuously taking their toll of plant parasitic nematodes, despite the absence of human manipulation.

Conclusions: Seinura is a predator of nematodes found commonly in Florida soils and inside dead or dying trees. Since it commonly occurs in trees infested with pinewood nematode, it may have promise as a biological control agent for pinewood nematode, a destructive, difficult to control parasite of pines.

LITERATURE CITED:

1. Esser, R. P., R. C. Wilkinson, Jr., and K. J. Harkcom. 1983. Pinewood nematode (Bursaphelenchus xylophilus) survey in Florida. Proc. Soil & Crop Sci. Soc. Fla. 42:127-132.
2. Fuchs, G. 1931. Seinura gen. nov. Zoologischer Anzeiger 94:226-228.
3. Hechler, H. C. 1963. Description, developmental biology, and feeding habits of Seinura tenuicaudata (de Man) J. B. Goodey, 1960 (Nematoda: Aphelenchoididae) a nematode predator. Proc. Helminth. Soc. Washington 30(2):182-195.
4. Linford, M. B., and Juliette M. Oliveira. 1937. The feeding of hollow-spear nematodes on other nematodes. Science 85:295-297.
5. _____. 1937. The feeding of some hollow stylet nematodes. Proc. Helminth. Soc. Washington 4:41-46.
6. Massey, C. L. 1974. Biology and taxonomy of nematode parasites and associates of bark beetles in the United States. Agric. Handbook, Forest Service, U.S. Dept. Agric. (1974) No. 446, v + 233 pp.

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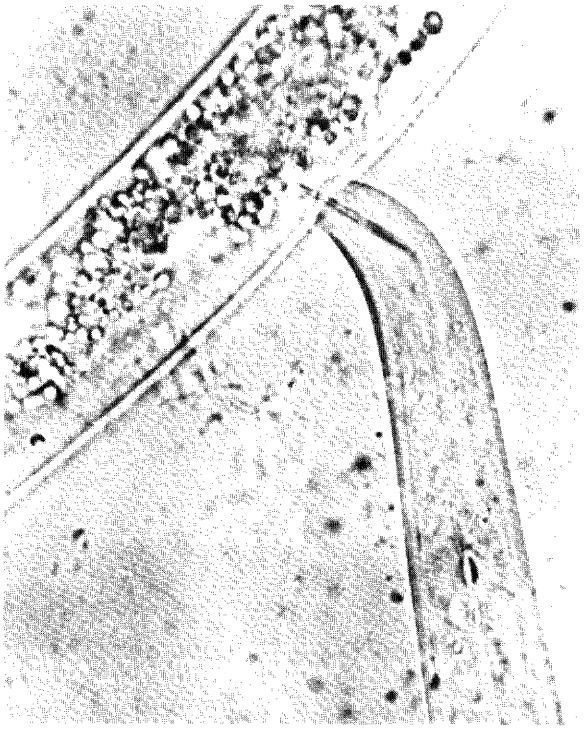

Fig. 2. Feeding Seinura spp. Head appressed to cuticle of burrowing nematode with stylet penetrating.

Fig. 3. Seinura sp. feeding on a citrus nematode.

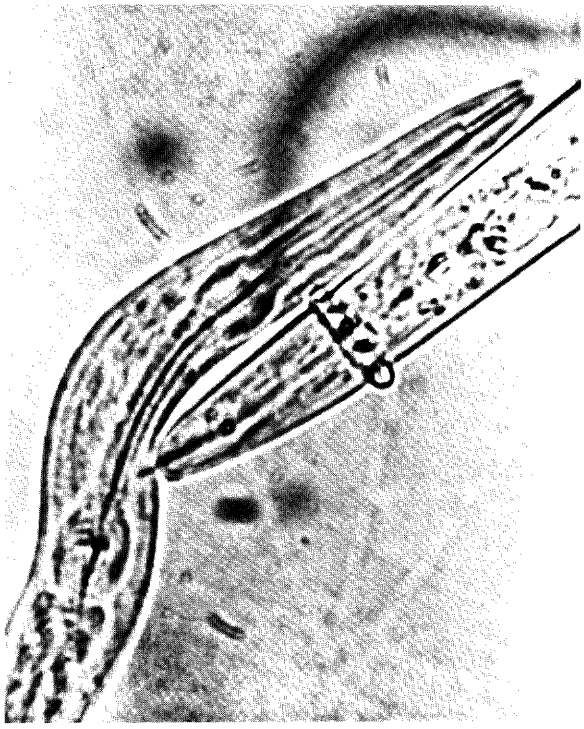

Fig. 4. Seinura sp. parasitized with a lethal fungus trapping ring feeding on Rhabditis sp.

Fig. 5. Two Seinura feeding on a single bacteriophagous larva.

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